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The Study on the Influence of Academic Pressure on Academic Performance

Ziye Ma

School of Public Administration, Sichuan University, Chengdu 610065, China

Abstract: The academic pressure of students is a hot issue concerned by the school, family and all walks of life. Academic pressure will have a lot of impact on students' psychology, physiology and so on, and then affect their academic performance. The study of the influence of academic pressure on academic achievement can help the society to correctly view the relationship between stress and achievement, provide the basis for reducing the burden and reducing pressure, and create a better learning environment. Based on the data of Chinese education tracking survey, this paper discusses the relationship between academic achievement and academic pressure, and analyzes the heterogeneity of different student groups. The study found that there is a "inverted U-shaped" relationship between academic performance and academic stress, appropriate academic stress can promote academic performance, when the stress exceeds a certain critical value, it has a negative impact on academic performance; at the same time, the compressive ability of boys is stronger than that of girls, and the Anti-stress ability of urban students is stronger than that of rural students.

Keywords: Academic Pressure; Academic Performance; Double Reduction Policy.

1. Introduction

On July 24, 2021, the General Office of the State Council issued the "opinions on further reducing the homework burden and out-of-school training burden of students in compulsory Education". At present, students are under pressure from many aspects, each student's perception and adaptability to stress is different, and there will be different experiences of stress. However, these pressures may give birth to or strengthen the degree of anxiety, which in turn will have an impact on learning motivation, learning psychology, physiological mechanism, and academic performance [1]. On the one hand, greater academic pressure may make students overburden their studies, thus affecting students' physical and mental health and their interest and creativity in learning; on the other hand, there is bound to be a burden in learning, and the necessary academic pressure is the driving force for students to learn [2]. Therefore, it is necessary to study the relationship between academic pressure and academic achievement. What kind of academic pressure can create higher learning efficiency? This is conducive to rectifying the mentality of parents, schools, and society, and providing a better learning environment for students.

2. Summary of Research

2.1. Academic Pressure

Academic stress is an abstract and vague concept, and everyone has particularity and difference in the ability to bear stress. Therefore, academic stress has a certain degree of subjectivity. This is different from the "academic burden". "Academic burden" refers to the phenomenon of excessive academic work and psychological stress in students' study and life [3]. It is more inclined to the amount of homework students bear, and academic pressure mainly refers to the psychological pressure of students in academic aspects. Chinese scholars have achieved fruitful research on academic burden. For example, scholars Luo Qiang and others have found that there is no simple linear relationship between academic performance and academic burden, only when the burden is moderate and the students are happy, their academic performance will be more prominent [4]. Through the study of CEPS2015 data, Zhang Ai and others found that extracurricular tutoring will increase the objective academic burden of students and reduce the subjective burden of students [5].

Each student's bearing ability to the subject is different, and the state will be different, so it is inaccurate to describe the pressure students feel in the face of their studies with academic burden. All of us choose academic stress as a variable, which can better reflect the actual psychological state of students.

2.2. Academic Pressure and Academic Performance

At present, academic circles agree that academic pressure is an important factor affecting academic performance, but there is no agreement on how academic stress affects academic performance. Zhang Shanshan and others believe that academic stress has a negative impact on students' performance [6]. But at the same time, scholars Liu Su and others found that moderate academic stress has a positive effect on academic performance, which is helpful for students to maintain the motivation of learning, to improve their academic performance [7]. In addition, Yu Guoliang and others found that there was no significant relationship between stress and academic achievement, but the correlation between students' adaptive behavior and academic achievement was more significant [8].

To sum up, previous studies mostly discuss the linear relationship between academic stress and academic achievement, but lack of research on the complex relationship between the two, so there is no agreement on the impact relationship. Based on this, this study argues that the relationship between academic stress and academic performance is not a simple linear relationship, on the one hand, appropriate stress can provide motivation for students to learn; on the other hand, excessive stress will cause

students to lose attention and always maintain tension, thus inhibiting the improvement of academic performance. Therefore, the assumptions put forward are as follows:

Hypothesis 1: there is an "inverted U-shaped" relationship between academic performance and academic pressure.

The research ideas of this paper are as follows: first, the nonlinear regression model of academic stress and academic achievement is constructed, and the nonlinear relationship between the two is verified by adding the quadratic term of academic stress. Secondly, this paper also pays attention to the problem of educational fairness, discusses the impact of academic stress on academic achievement in different student groups, and further verifies the previous conclusions.

3. Description and Analysis of Variables

3.1. Data Sources and Variable Descriptions

The data used in this study are from the personal database of Chinese Family Panel Studies 2018 survey data (hereinafter referred to as CFPS2018) by the China Social Science Survey Center of Peking University. Through the screening of the missing value and abnormal value of the sample, the final sample size is 1140. At the same time, all the samples meet the condition that they are still in school.

According to the purpose of the study and the availability of the data, the dependent variable of this paper is the score of CFPS2018 children's mathematics test, which is a continuous variable, and the independent variable is mainly academic pressure, which is an ordered classification variable in CFPS2018, which increases gradually from 1 to 5. In addition, there are a series of variables that may affect academic performance, such as sex, household registration, age, study time and so on. The description and descriptive statistics of the variables are shown in Table 1. As can be seen from the table, the average score of the students' math test is about 18 points, and the standard deviation is close to 5. The average value of academic stress is about 3, indicating that the stress value of students is generally moderate stress. The non-weekend study time is 9 hours, the average daily study time is 1.8 hours, the weekend average study time is 4 hours, the average daily is two hours. Overall, the study time is less. The average gender value is 0.49, the ratio of men to women is a little more balanced, the average household registration is 0.73, which means that the number of urban students is far more than the number of rural students; the average age is about 18 years old, the minimum value is 16 years old, the maximum value is 24 years old. Most of the samples are in high school. The average amount of spare time surfing the Internet is 16 hours, with an average of about 2 hours a day; the proportion of learning talents is about 45%, nearly half; and the average expected level of education is 6.7, indicating that most people expect to go to college or undergraduate positions.

Table 1. Descriptive statistics of variables

Variable name	n	Mean	SD	Min	Max	Variable description
Mathematics test score	1,140	17.9947	4.9627	1	24	Continuous variable
Academic pressure	1,140	3.0825	0.9629	1	5	The ordered classification variable "1" indicates no pressure; "5" indicates a lot of pressure
Non-weekend study time	1,140	9.0209	3.4449	0	24	Continuous variable
Weekend study time	1,140	4.2185	3.5775	0	24	Continuous variable
Gender	1,140	0.4877	0.5000	0	1	0 female 1 male
Household registration	1,140	0.7298	0.4442	0	1	0Agricultural hukou 1 non-agricultural hukou
Age	1,140	18.4439	2.0212	16	24	Continuous variable
Spare time to surf the Internet	1,140	16.0997	14.9953	0.1	100	Continuous variable
Proportion of learning talents	1,140	44.7149	22.9923	0	100	Continuous variable 0 represents the lowest 100 stands for the highest
Expected level of education	1,140	6.7079	0.8848	3	11	Ordered classification variable
School stage	1,140	5.4254	0.9677	3	8	Ordered classification variable

3.2. Analysis of Pressure in Each Group

Academic stress is subjective, and the perception ability of different groups to stress is different. Table 2 shows the statistics of academic stress felt by different groups in learning. In terms of gender, women feel more academic stress than men, which may be since women are more sentimental and vulnerable to stress; in household registration, the academic pressure of urban student is greater than that of rural student, because students in cities are more competitive and feel more stress. In the school stage, it is obvious that with the improvement of academic qualifications, the academic pressure decreases. On the one hand, this is related to the characteristics of our education. The students in primary and secondary schools are under great pressure from the school, parents, and society, and the academic pressure on college students is reduced. On the other hand, with the improvement of academic qualifications, students will reduce the pressure on their own studies, and transfer to their own career planning and future development pressure.

3.3. Metrological Models and Methods

According to the correlation analysis above, the model of learning stress affecting academic achievement is as follows:

$$Score_i = \beta_0 + \beta_1 P_i^2 + \beta_2 P + \beta_3 X_i + \varepsilon_i \quad (1)$$

The dependent variable $Score_i$ refers to the academic performance of each individual, which is replaced by the score of mathematics test in CFPS2018, P_i is the academic pressure that individual feels, and it is an ordered classification variable, and the pressure increases gradually from 1 to 5, P_i^2 is its quadratic term, β_1 is the regression coefficient of the quadratic term of academic stress, β_2 is the coefficient of the primary term of academic stress, X_i is other variables that affect students' academic performance,

including non-weekend study time, weekend study time, age, sex, household registration, proportion of learning talents, spare time to surf the Internet, school stage, expected education level, the coefficient is β_2, β_0 is an intercept, ε_i is a residual item.

Table 2. Stress magnitude of different populations

Variable	n	Mean	SD	Min	Max
Gender	-	-	-	-	-
Female	585	3.1969	0.8809	1	5
Male	556	2.9622	1.0294	1	5
Household registration	-	-	-	-	-
rural	308	2.9448	0.9754	1	5
urban	832	3.1334	0.9539	1	5
School stage	-	-	-	-	-
Primary school	3	3.6667	1.1547	3	5
Junior middle school	142	3.2535	0.9259	1	5
High school / technical secondary school / technical school / vocational high school	594	3.0926	1.0092	1	5
College	180	3.0111	0.9454	1	5
University undergraduate degree	210	2.9857	0.8666	1	5
Master of Science	11	3.1818	0.6030	2	4

If the coefficients of β_1 and β_2 are negative and positive numbers respectively, and both are statistically significant, which indicates that there is an "inverted U-shaped" relationship between academic achievement and academic stress, hypothesis 1 is verified; if the coefficients of β_1 and β_2 are positive and negative numbers respectively, and statistically significant, which indicates that there is a “U-shaped” relationship between academic performance and academic stress.

4. Empirical Results and Analysis

4.1. Basic Regression

The regression results of the influence of academic stress on academic achievement are shown in Table 3. From the regression results, the coefficient of secondary term of academic stress is significantly negative, and the coefficient of primary term is significantly positive. Hypothesis 1 is verified, that is, there is an "inverted U-shaped" relationship between academic performance and academic stress. And according to the characteristics of quadratic function, we can get the maximum value of academic achievement when the academic pressure is 2.472. In addition, both non-weekend learning time and weekend learning time have a significant impact on academic performance. The longer the study time is, the better the performance is, and the more efficient the study is during the week than the weekend study, and the greater the impact on performance. On the one hand, it may be because the week generally studies in school, and the efficiency may be higher. On the other hand, when reviewing and consolidating knowledge points over the weekend, it is already some distance from the time when the teacher talks about knowledge points, and the efficiency is not as high as that in the week. In terms of gender, boy’s grades will be better, which may be because this article chooses to use math test scores instead of academic performance, generally speaking, boys' math scores will be better than girls. Finally, learning talent and expected educational level also have a significant positive effect on academic performance, which is not difficult to understand. Under the same circumstances, when the higher the learning talent, the better the academic performance; when students expect their higher educational level, the pursuit of learning is higher, the attitude towards learning is more serious, and the academic performance will naturally be better.

Table 3. Regression results of the influence of academic stress on academic performance

Variable	(1)
Secondary item of academic stress	-0.378 ***
	(0.000)
Academic pressure	1.869 ***
	(0.002)
Non-weekend study time	0.277 ***
	(0.000)
Weekend study time	0.200 ***
	(0.000)
Gender	0.493 *
	(0.058)
Household registration	-0.011
	(0.970)
Age	0.038
	(0.710)
Spare time to surf the Internet	-0.001
	(0.824)
Proportion of learning talents	1.681 ***
	(0.000)
Expected level of education	1.127 ***
	(0.000)
Constant term	-5.426 ***
	(0.002)
Observed value	1,140
R-squared	0.287

T-statistics in parentheses

*** P < 0.01, * * p < 0.05, * p < 0.1

4.2. Heterogeneity Analysis

Through regression by group, we can study the influence of academic stress on academic performance of different groups. In addition, we can further test the hypothesis put forward earlier. Table 4 is the regression result of different groups. Column (2) (3) is the result of regression of girls and boys, and column (4) (5) is the regression result of rural students and urban students, respectively.

The regression results of each subsample were significantly negative in the secondary term of academic stress, and the primary item of academic stress was significantly positive, which further verified the hypothesis above, that is, there is an "inverted U-shaped" relationship between academic performance and academic stress. In column (2) (3), it can be obtained that when the academic pressure of girl is 2.21, the academic performance is the highest, and when the academic pressure of boys is 2.93, the academic performance is the highest, which indicates that boys have stronger compressive ability and should put a little more pressure on men. In column (4) (5), it can be calculated that when the pressure of rural students is 2.69, the academic performance is the highest, and when the academic pressure of urban students is 2.77, the academic performance is the best, which indicates that the compressive ability of urban students will be slightly higher than that of rural students.

Table 4. Multiple regression results for each group

Variable	(2)	(3)	(4)	(5)
Secondary item of academic stress	-0.408 **	-0.637 ***	-0.377 *	-0.656 ***
	(0.012)	(0.000)	(0.063)	(0.000)
Academic pressure	1.800 *	3.727 ***	2.027 *	3.636 ***
	(0.081)	(0.000)	(0.089)	(0.000)
Other control variables	Control	Control	Control	Control
Constant term	14.811 ***	10.796 ***	14.101 ***	10.257 ***
	(0.000)	(0.000)	(0.000)	(0.000)
Observed value	584	556	308	832
R-squared	0.077	0.085	0.051	0.081

T-statistics in parentheses

*** P < 0.01, * * p < 0.05, * p < 0.1

4.3. Robustness Test

To verify the robustness of this experiment, the mathematical test score represented by variables is replaced with the phrase score in CFPS2018, and then the regression is carried out, and the results are shown in Table 5. It can be found that the coefficient of the secondary term of academic pressure is significantly negative, and the coefficient of the first term is significantly positive, which further verifies the hypothesis that there is an "inverted U-shaped" relationship between academic performance and academic stress, and the results are robust.

Table 5. Robustness test

Variable	(6)
Secondary item of academic stress	-0.254 ***
	(0.002)
Academic pressure	1.342 ***
	(0.006)
Constant term	28.024 ***
	(0.000)
Observed value	1,140
R-squared	0.029

T-statistics in parentheses

*** P < 0.01, * * p < 0.05, * p < 0.1

5. Conclusion and Implications

This paper uses CFPS2018 data to discuss the relationship between academic achievement and academic perssure, uses multiple regression model to discuss the influence of academic stress on academic achievement, tests the complex relationship between academic achievement and academic stress by adding the quadratic term of academic stress, and analyzes the heterogeneity of different student groups. Through the previous research, we can get the following conclusions: firstly, the relationship between academic performance and academic stress is "inverted U" relationship, appropriate stress can improve students' consciousness and promote academic performance; when the stress exceeds a certain critical value, it has a negative impact on academic performance. In addition, learning during the week is more efficient than weekend learning, which has a greater impact on academic performance. According to the sample, women have lower tolerance to stress and are more vulnerable to academic stress. Men have better tolerance to academic stress, students in rural areas are more affected by stress, and urban students have better stress resistance.

The above research shows that the more academic pressure is not the better. Every student has a critical value of academic stress. When the perceived academic stress exceeds this value, it has a negative impact on academic performance. At the same time, nor can it be completely stress-free, the appropriate acceptable range of pressure can promote academic performance. In addition, different groups of students have different perception of stress, and the degree of influence on academic performance will also be different. To make the academic performance of each group of students achieve the best, it can appropriately reduce the academic pressure of girls and increase the academic pressure of boys; similarly, properly increase the academic pressure of urban students and reduce the academic pressure of rural students. Finally, in the current learning environment, the academic pressure of most students is greater than the stress value corresponding to the highest point of "inverted U". Therefore, schools and families should consider how to reduce academic stress for students, to urge students to complete learning tasks in school and improve the time of physical exercise and outdoor activities, so as to reduce students' academic pressure and improve students' academic performance.

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